

Letter Health Consultation

CINNAMON SQUARE SUBDIVISION SITE

SPRINGFIELD, MISSOURI

NOVEMBER 21, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

CINNAMON SQUARE SUBDIVISION SITE

SPRINGFIELD, MISSOURI

Prepared By:

Missouri Department of Health and Senior Services
Division of Community and Public Health
Bureau of Environmental Epidemiology
under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry



Missouri Department of Health and Senior Services

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Jane Drummond
Director



Matt Blunt
Governor

October 25, 2007

Cinnamon Square Homeowner's Association
Mr. Alan Stone, President
3864 E. Country Place
Springfield, MO 65809

Dear Mr. Stone:

The Missouri Department of Natural Resources (MDNR) is investigating the eastern part of Greene County, Missouri for lead contamination associated with past mining activities in this area. This letter is in response to MDNR's request to the Missouri Department of Health and Senior Services (DHSS) to provide you with health information on the lead sampling results they found within your subdivision. During this investigation, MDNR discovered elevated levels of lead in the Cinnamon Square Commons, north of Blueridge Street and south of Cinnamon Place, within the Cinnamon Square subdivision (See Figure 1). DHSS works with MDNR and the federal Agency for Toxic Substances and Disease Registry (ATSDR) throughout the state to provide health information and recommendations to individuals and communities living near formerly mined areas such as this.

On April 17, 2007, MDNR analyzed samples from the Cinnamon Square Commons area using an X-ray fluorescence instrument (XRF), and detected levels of lead as high as 3,003 parts per million (ppm) around the old milling area (See Figure 2). These levels were later confirmed by laboratory analyses that found lead levels as high as 3,337 ppm (1). In general, concentrations of lead at this level pose a health risk, especially to children under 72 months of age.

Based on the attached site sketch by MDNR (Figure 2) we see that this is a recreational area for the Cinnamon Square subdivision that includes a pool, pavilion, basketball court, tennis court, and children's play equipment. We also understand that the mine waste pile identified on the map is also known as the "Children's Mountain", and has been a popular recreation spot for children, as have the mill ruins adjacent to the pile. Unfortunately, most of the highest levels of lead were detected around the concrete pillars of the mill ruins (See Photos 1 and 2). Children and other individuals may be exposed to high levels of lead by playing in this area or by crossing this area to the other play areas. Almost all of the samples in the remaining area of Cinnamon Square Commons and the surrounding residential area showed lead below 400 ppm (1).

As we understand, shortly after MDNR informed you of the April 17, 2007, sampling results a construction-type fence was erected around the mill ruins, where the elevated levels of lead are located. This action should lessen the potential for exposure to the lead contaminated area by neighborhood children. However, the construction fencing is not a particularly effective barrier in the long-term, and without maintenance this type of fencing is not at all permanent.

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Below are a discussion of the potential health effects of lead, some conclusions regarding this site and some recommendations to help community members protect their own health and that of their families.

Toxicological Summary:

The pathways of concern for lead exposure are inhalation and ingestion. Lead is not readily absorbed through the skin, so dermal contact is not an important route of exposure. Studies have shown that there is a definite correlation between concentrations of lead in soils and blood lead levels in children. In general, blood lead levels increase as the lead concentrations in soil and dust increase. As blood lead levels increase, the likelihood of adverse health effects also increases. Examples of adverse health effects of children exposed to lead include learning difficulties and behavioral problems.

The U.S. Environmental Protection Agency (EPA) uses 400 ppm of lead as a standard clean up level for residential soils. In general, when the area is used by sensitive populations (such as children under 72 months of age or pregnant women) on a regular basis, EPA recommends removal of residential soil containing lead concentrations above 400 ppm. However, site-specific action levels may vary.

Conclusions:

In the past, it is likely that individuals, and especially children, were exposed to the elevated levels of lead around the mill ruins in the Cinnamon Square Commons. Because of the previous potential exposures to lead-contaminated materials in the environment, we consider the site to be a *Public Health Hazard* for the past. The category of a public health hazard is assigned to sites that pose a public health hazard as the result of long-term exposures to hazardous substances.

Because site access has been temporarily restricted by the construction-type fencing, the site is considered a *No Apparent Public Health Hazard* in the present. A no apparent public health hazard is assigned to sites where human exposure to contaminated media is occurring, but the exposure is below a level of health concern. However, a more permanent solution should be found to reduce or eliminate lead exposure at this site. As long as the fencing is maintained and stays in place until a permanent solution is implemented, the site may remain *No Apparent Public Health Hazard*. However, if the fencing fails or is not maintained the site would again be considered a *Public Health Hazard*.

Recommendations:

To determine and further reduce the possibility of lead exposure at this site, DHSS recommends the following for the residents of the Cinnamon Square subdivision:

1. Have children's blood lead tested to determine if their potential exposure has affected their blood lead levels.
2. Ensure children practice good personal hygiene such as washing their hands before eating and provide them with a healthy diet high in calcium to lessen lead uptake into their bodies.

3. Maintain current barrier until a permanent remedial solution can be achieved to prevent children from being exposed to the high lead contamination.

DHSS/ATSDR will take the following steps to protect public health as needed.

1. DHSS/ATSDR will review additional sampling data as it becomes available and provide guidance regarding possible health risks if necessary.
2. DHSS/ATSDR will address community health concerns and questions as they arise.
3. DHSS/ATSDR will provide health education and educational materials when requested.

If you have questions or concerns, please contact Arthur Busch or Jonathan Garoutte of my staff at (573) 751-6102 or toll-free at (866) 628-9891.

Sincerely,

Cherri Baysinger
Bureau Chief
Bureau of Environmental Epidemiology

Cc: Michael Stroh, MDNR
CB:JG:AB

References

1. Missouri Department of Natural Resources sampling results of Greene County Mines Sites, Missouri. 2007, August.
2. US Environmental Protection Agency. Superfund Lead-Contaminated Residential Sites Handbook. 2003 August.
3. Agency for Toxic Substances and Disease Registry. Toxicological profile for lead, update. Atlanta: US Department of Health and Human Services. 1999 July.
4. National Toxicology Program. Lead (CAS No. 7439-92-1) and Lead Compounds Substance Profiles. Report on Carcinogens, Eleventh Edition; 2004.
5. American Cancer Society. Cancer facts and figures, 2007. Atlanta: American Cancer Society, Inc; 2007.

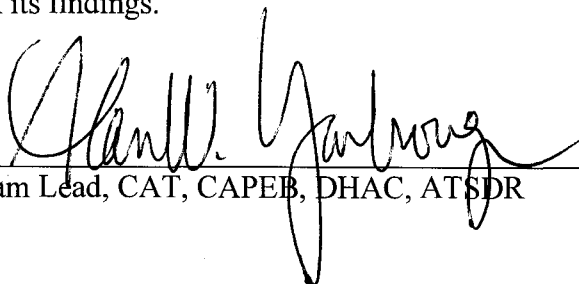
CERTIFICATION

This Cinnamon Square Common Area Letter Health Consultation was prepared by the Missouri Department of Health and Senior Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation (DHAC), has reviewed this health consultation and concurs with its findings.



Team Lead, CAT, CAPEB, DHAC, ATSDR

Appendix 1: Toxicological Evaluation

Discussion

This section will discuss the health effects of exposure to lead. A discussion of non-cancerous health effects is included, and the possibility of the contaminants causing cancer is evaluated.

ATSDR has developed Comparison Values (CVs) that are media-specific concentrations used by health assessors to select environmental contaminants of concern. However, ATSDR has not developed a CV for ingestion of lead through soil. Instead, exposure to lead is evaluated by using a biological model that predicts a blood lead concentration that would result from exposure to environmental lead contamination. The modeled blood lead concentration is then compared to the level of concern for blood lead concentrations in children as recommended by the Centers for Disease Control and Prevention (CDC). CDC's current level of concern is 10 microgram of lead per deciliter of blood (10 µg/dL) (10). Using this model, EPA has established a standard clean up value of 400 ppm for lead in soil using the default parameters in this model (2). The default parameters in the model include estimated soil ingestion and time spent outdoors. If the default parameters are found to not be accurate in an area being investigated, the clean up value used at that site may be different.

Lead is a naturally occurring metal found in the earth's crust. It has no characteristic taste or smell. It is mined and processed for use in various industries. It is used in some types of batteries, ammunition, ceramic glazes, medical equipment, scientific equipment, and military equipment. At one time, lead was used as an additive in gasoline and paint. Paint containing lead may still be present in older homes and becomes more available for uptake into the body, especially for children, if it is deteriorated or flaking. Lead contamination can also be found in lead smelter and mine tailings waste where contact and exposure can easily occur (3).

The pathways of concern for lead exposure are inhalation and ingestion. Lead is not readily absorbed through the skin, so dermal contact is not an important route of exposure. The correlation between lead-contaminated soil and blood lead level are influenced by many factors, including access to soil, behavior patterns (especially of children), presence of ground cover, seasonal variation of exposure conditions, particle size and composition of lead compounds found at various sites, and the exposure pathway (3).

An unborn child can also be exposed to lead if their mothers have lead in their bodies. This exposure can cause problems such as premature births, low birth weight, decreased mental ability, learning difficulties, and reduced growth as young children (3).

Cancer

While the EPA considers lead to be a probable human carcinogen and the National Toxicology Program (NTP) has determined that lead and lead compounds are reasonably anticipated to be

human carcinogens based on limited studies (3,4), there has been no studies linking residential ingestion or inhalation of lead contaminated soil or drinking water to increased cancer risks. Although the American Cancer Society estimates that in the United States, slightly less than half of all men and slightly more than one-third of all women will develop some form of cancer in their lifetime (5), the primary health concern for lead at the Cinnamon Square Commons area is not cancer, but lead's effect on the nervous system, especially for children less than 72 months of age.

Children's Health

In general, children are more susceptible to lead poisoning than adults and are more likely to be exposed to lead contaminated materials. In their daily activities, children have a tendency for frequent hand-to-mouth contact and often introduce non-food items into their mouths. Because children are smaller and their bodies typically retain more of the contaminants, it usually takes less of a contaminant to cause adverse health effects in children than adults.

Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. Also, compared to adults, a larger proportion of the amount of lead swallowed will enter the blood in children. While about 99% of the amount of lead taken into the body of an adult will leave as waste within a few weeks, only about 32% of lead taken into the body of a child will leave as waste. This allows for greater accumulation of lead in the child's system (3).

When children are exposed to lead contaminated materials, a variety of adverse health effects can occur depending on the level of lead to which they are exposed and the duration of exposure. These effects include learning disabilities, slowed growth, hyperactivity, impaired hearing, and at very high exposure levels, even brain damage. Unborn children can also be exposed to lead through their mothers if their bodies contain lead and are at risk of premature birth, low birth weight, decreased mental ability, learning difficulties, and reduced growth as young children (3).

Children who exhibit pica behavior may be at an even greater risk of becoming exposed to contaminants in soil than other children. Individuals who exhibit pica behaviors have a craving to put non-food items in their mouths or eat non-food items, such as dirt, paint chips sand, etc. (3).

Blood lead levels of 10 µg/dl are associated with learning difficulties in children. Yearly blood-lead testing before a child is 72 months of age is key to determining if the child has been exposed. Eliminating exposure pathways by controlling contamination sources, practicing good personal hygiene, and eating a proper diet high in calcium can prevent lead poisoning in children. The emphasis of blood-lead testing is on children less than 72 months of age who are the most susceptible to blood-lead poisoning.

Appendix 2 Figures and Photos

Figure 1

Site Location Map, Cinnamon Square Commons Area,
Springfield, Greene County, Missouri

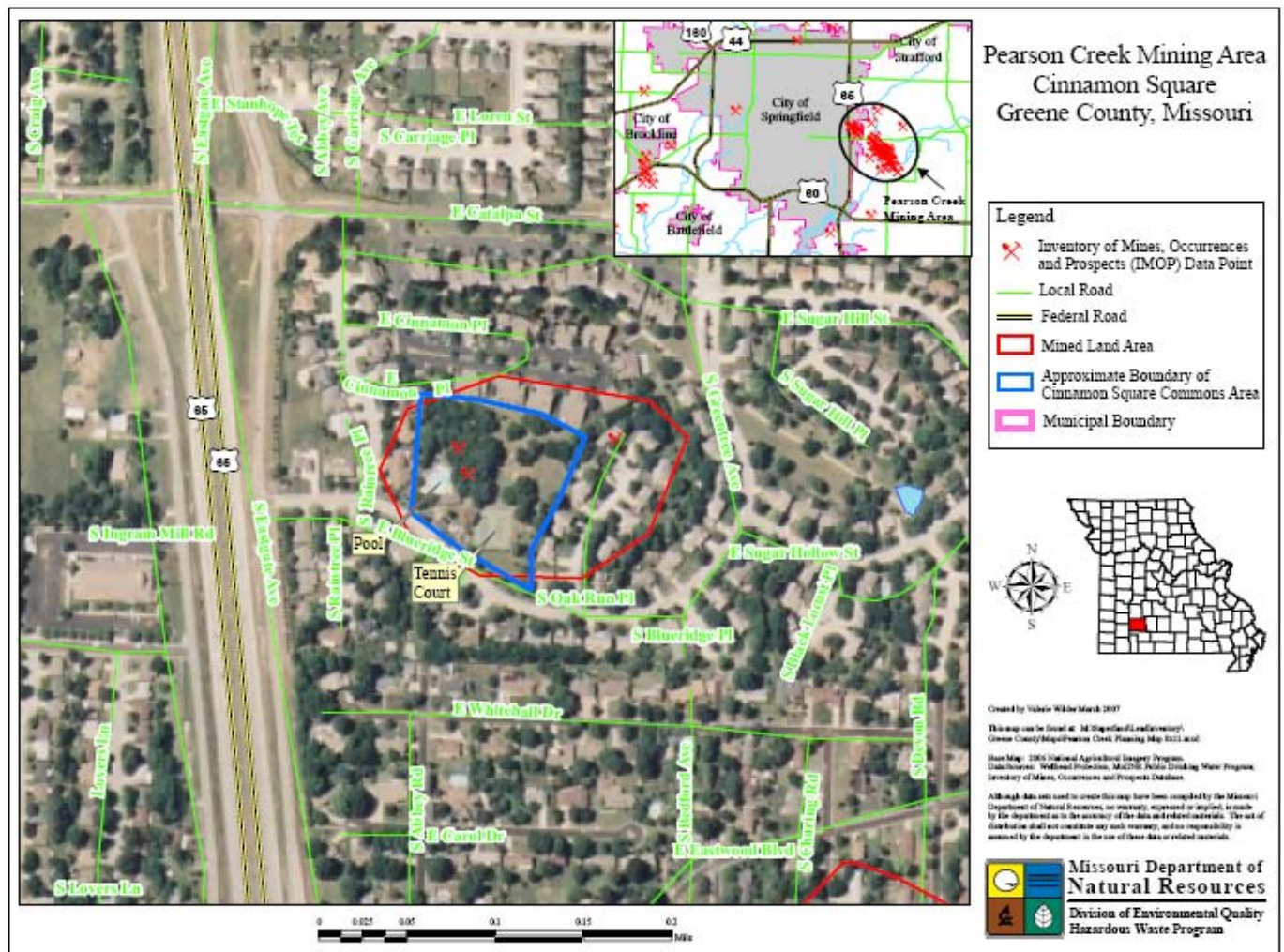
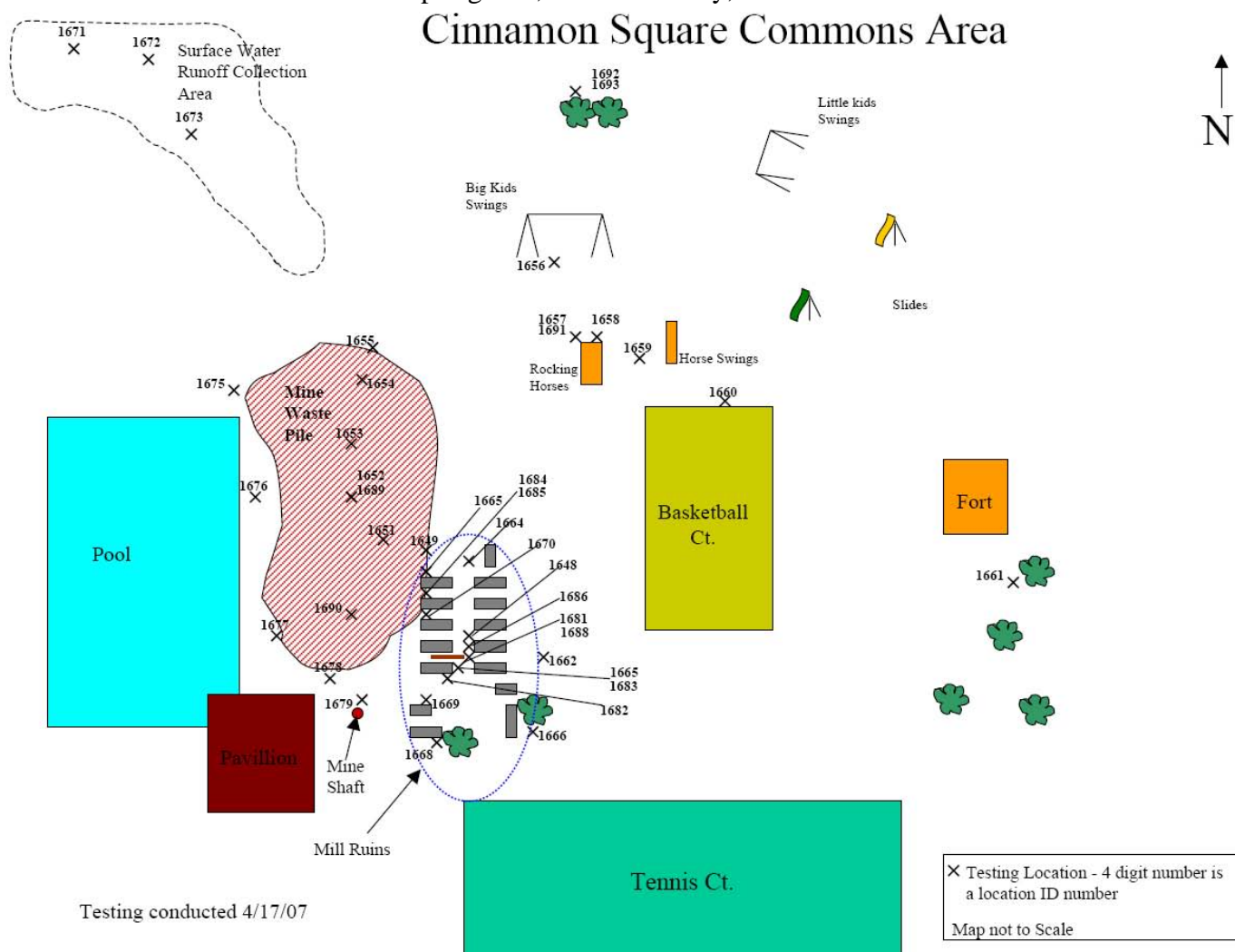


Figure 2
Cinnamon Square Commons Area Sampling Diagram
Springfield, Greene County, Missouri



Source: Missouri Department of Natural Resources

Photo 1

Cinnamon Square Commons Area Former Mining Site, Mills Ruins
Springfield, Greene County, Missouri



Source: Missouri Department of Natural Resources

Photo 2

Cinnamon Square Commons Area Mine Waste Pile
Springfield, Greene County, Missouri



Source: Missouri Department of Natural Resources